

STATE OF TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION DIVISION OF UNDERGROUND STORAGE TANKS

TECHNICAL CHAPTER 4.2 SPILL AND OVERFILL PREVENTION

EFFECTIVE DATE: TBD

PURPOSE

The purpose of this technical chapter is to assist Division of Underground Storage Tanks (Division) staff in understanding the regulatory requirements of spill and overfill prevention. This document will give guidance for the proper installation, operation and maintenance, inspection, and testing practices and recordkeeping requirements for underground storage tank (UST) systems with various types of spill containment and overfill prevention devices as well as the spill and overfill reporting requirements.

This technical chapter contains the current policy of the Division based on the statute and regulations governing the Tennessee Petroleum Underground Storage Tank program. This document supersedes all previously published versions. The most current version of this technical chapter will be posted and always available on the Division's website.

AUTHORITY

All rules referred to in this technical chapter are contained in Chapter 0400-18-01 and are available on the Division of Underground Storage Tanks website at http://www.tn.gov/sos/rules/0400/0400-18/0400-18-01.20120307.pdf

APPLICABILITY

Every tank that is filled by transfers of a petroleum substance of at least 25 gallons <u>at one time</u> is required to have spill and overfill prevention. This applies to all product tanks including tanks using remote fills. If a tank has more than one fill pipe, then all fill pipes must have spill containment. See rules .02(1)(d)2. and .02(3).

EXCEPTIONS:

• Waste oil tanks usually do not require spill prevention devices (spill buckets) to be installed since waste oil tanks are filled with small quantities of oil at a time. See rule .02(3)(a)2.(ii). Although not required by Division regulations, waste oil tanks may have a spill bucket installed at the port where the tank is emptied. For waste oil tanks with spill prevention devices installed, the Division policy does not require the owner/operator to perform monthly inspection and/or maintenance of these devices but it is a best management practice.

• Although not as common, some tanks may be filled at a port which is in a contained box, vault, room, or bermed surface area which may suffice as spill prevention. In these cases, if the containment area is sufficiently designed to be impervious and not allow a spill to be released to the environment, then it meets the requirements of rule .02(3)(a)2.(i) and a "spill bucket" is not required. However, they do require periodic inspection and repair and/or replacement if found defective. Any visible cracks in the concrete will require repair. (See examples below)



Bermed area at remote fills



Spill device built into wall

• Some fill ports may be contained within a <u>sealed</u> submersible turbine pump sump. In this case, the submersible turbine pump sump meets the definition of a spill bucket as required by rule .02(3)(a)2.(i).



"All-in-one" Sump not requiring spill bucket

NOTE: Inspectors that encounter alternative equipment should consult the Field Operations Coordinator to determine if further review is required.

SPILL PREVENTION

Spill prevention devices are used at fill pipes to catch drips and small spills of fuel that may occur when the delivery hose is disconnected from the fill pipe. The most common type of spill prevention device is called a "spill bucket" or "catchment basin". (See examples on page 3 and 4)

- A spill prevention device (spill bucket) is typically not designed to contain product for long periods of time.
- Some spill prevention devices (spill buckets) are equipped with a drain back mechanism or manual pump that allows accumulated product to drain back into the tank. See the "Maintenance" section for

photographs of drain back mechanism and manual pumps. Drain back mechanisms are normally closed and hold liquid in the bucket until activated, when product drains into the tank. Activating the drain back mechanism also allows any liquid such as rainwater or parking lot runoff to drain into the tank. Drain back mechanisms occasionally get stuck in the open position by a foreign object blocking proper closing of the device. Many drain back mechanisms have a screen to keep larger objects out, but do nothing to prevent the inflow of water that gets into a spill bucket.

- The Division recommends that spill bucket drain back mechanisms not be used on tanks storing E-85 fuel due to the potential for water ingress and phase separation. It is especially important that these be maintained in proper working order and seal tightly if installed on any ethanol blended fuel tanks.
- If spill prevention is not equipped with a drain back mechanism or pump, then any product or water in the spill bucket must be removed manually and disposed of properly.
- Manual pumps are pneumatic devices that allow the liquid in the spill prevention device to be easily pumped out. If the spill prevention devices at the facility are equipped with one of these devices, then the removed liquid must be properly disposed of and not pumped onto the ground or paved area.
- Lids or covers are required on spill buckets and are required to be in good condition and not in contact with the fill cap. If the cover does not fit tightly, dirt, sand, small gravel or other debris could also be drained into the tank through the drain back mechanism, if present. See rule .02(3)(b)2. and 3.
- Spill prevention devices are usually constructed of steel, plastic, or fiberglass but occasionally may be designed and constructed differently as detailed in the above "Exceptions".
- Installation practices generally specify spill buckets be installed at a slightly higher elevation than the surrounding pavement and the finished surface sloping away from the spill bucket. This helps keep rainwater and parking lot runoff from accumulating in spill buckets.

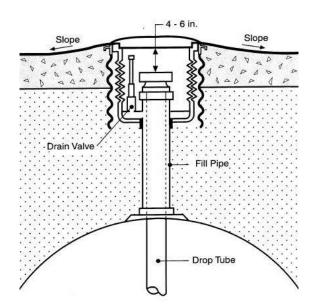
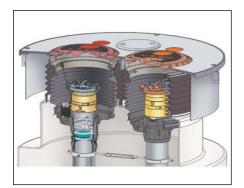


Diagram of an elevated spill bucket with drain back mechanism

• Below are examples of the most common types of spill buckets:





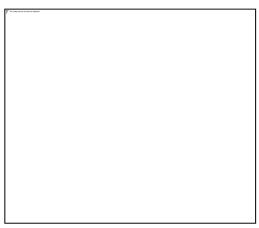


Typical Spill Bucket

Steel Spill Bucket

"Multi-port" sump with dual spill buckets







Plastic spill bucket

Fiberglass Spill Bucket

Newly installed spill bucket

Some spill buckets may be above-grade but still must meet all applicable requirements:



GENERAL REQUIREMENTS:

- Division regulations require that the owner/operator must ensure that the volume available in the tank (ullage) is greater than the volume of petroleum to be transferred to the tank <u>before</u> the transfer is made as required by rule .02(3)(b)1. This is usually accomplished by gauging (sticking) the tank or verifying the volume by reading the inventory printout from an ATG. Also, other agencies require that the transfer operation be <u>monitored constantly</u> to prevent overfilling and spilling as required by rule .02(3)(b)1.
- Spill prevention is required for every UST that is filled with more than 25 gallons of product at one time. See rule .02(3)(a)2.(ii).
- Spill prevention must prevent the release of product to the environment when the transfer hose is detached from the fill pipe. See rule .02(3)(a)1.(i).
- It must be kept free of any liquid, dirt, debris and any other substance that would interfere with the ability to prevent spills or interfere with its inspection. See rule .02(3)(b)3. and 4.



Liquid (water and/or fuel)



Dirt and/or debris

• All spill catchment basins (spill buckets) are required to have a lid in good condition that does not come in contact with the fill cap. See rule .02(3)(b)2.



Proper Lid



Damaged Lid



Spill bucket lid with seal



Universal 69RT/71CD Rim 15", Lid 12.75"

Pomeco Rim 21", Lid 17.25"

• All spill prevention devices must be visually inspected each month ensuring the above requirements are met. A log of these inspections must be kept for the last 12 months. See rule .02(3)(b)4.

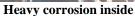
INSTALLATION:

• Installation must be in accordance with standard industry practices such as PEI RP-100 or API 1615, the manufacturer's installation instructions, and rule .02(1).

OPERATION AND MAINTENANCE:

- For as long as the UST system is used to store petroleum, owners and/or operators shall ensure that releases to the environment due to spilling do not occur. See rule .02(3)(b)1.
- All spill prevention devices must be kept clean of all substances whether liquid (water, fuel, etc.) or solid debris (soil, gravel, leaves, trash, etc.). See rule .02(3)(b)3. Spill prevention devices made of metal are many times subject to heavy corrosion which can accumulate over time until a thick layer forms and prevents adequate inspection of the walls and floor of the device where cracks or holes may be present. This corrosion must be removed and the device properly inspected. In the example below, heavy corrosion inside the device obscured the holes from being discovered during previous inspections:





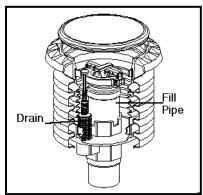


After excavation



After removal

• If the spill bucket is equipped with a bottom drain back mechanism, it must be properly maintained as required by rule .02(3)(b)3. If dirt and debris are allowed to accumulate, it may prevent the valve from sealing properly allowing water to enter the tank through the spill catchment basin. Also, if the valve on the drain back mechanism does not seal properly, it may interfere with the proper functioning of the overfill prevention if ball floats are used. Faulty drain back mechanisms must be repaired, replaced, or replaced with a plug to seal the valve opening and any liquid removed with a hand pump.



Drain Valve



Manual Type Hand Pump



Plunger Type Drain Valve



Pump Type Drain Valve

INSPECTION AND TESTING:

• The owner/operator must visually inspect all spill prevention devices each month to ensure the above requirements are met. A log of these inspections must be kept for the last 12 months. See rule .02(3)(b)4.

- During inspections, visually confirm that the spill prevention devices appear to be functional (no holes or cracks, no debris) and that the lid prevents rainwater and/or surface water runoff from entering the spill prevention device. Notations should be made on the Monthly Spill Bucket Inspection Log (CN-1286) attached in Appendix 2.
- For spill buckets, inspect the seal around the base of the riser near the floor of the device for any
 cracks, holes, or deformation which may indicate that the device will not contain liquid as
 required.



Defective Seal

REPORTING AND RECORDKEEPING:

- Monthly inspections are required for all spill prevention devices. The results of these inspections must be recorded on the Monthly Spill Bucket Inspection Log (CN-1286) as attached in Appendix 2. These logs must be maintained for the previous 12 months and made available upon request by the Division. See rule .02(3)(b)4.
- If a cracked or defective spill prevention device is discovered at any time, then the device shall be repaired or replaced. The owner/operator shall notify the Division within 72 hours prior to any repair (repairs may only be made if allowed by the spill bucket manufacturer) or replacement. If a defective spill prevention device is replaced, a Division inspector should be present to determine if an environmental impact has occurred and if a site check will be required. An owner/operator shall be given an opportunity to conduct an integrity test in lieu of replacement. If the integrity test determines that the bucket is tight, it would not require replacement. Testing may be conducted in accordance with Section 6 of PEI/RP- 1200-12 "Recommended Practices for Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities" or by following the Hydrostatic Testing Procedures described in Appendix 1
- Fuel is sometimes spilled when the fuel delivery hose is disconnected. Any spill or overfill of petroleum that exceeds 25 gallons or causes a sheen on nearby surface water must be reported within 72 hours. Spills and overfills under 25 gallons that are contained and immediately cleaned up do not have to be reported. See rule .05(4).
- Records of any spills, cleanup and abatement activities must be maintained for the operational life of the tank system as required by rule .02(7)(f) and transferred to any new owners as required by rule .03(2)(d).

OVERFILL PREVENTION

Overfill prevention devices required by rule .02(3) are installed in the UST to help prevent the tank from being overfilled during product delivery. Overfill prevention devices are designed to reduce product flow, stop product flow, or alert the delivery person during delivery before the tank becomes full and product is released into the environment.

There are three common types of overfill prevention devices:

Flow restrictive (ball float valves): A ball float valve (also called a flow vent valve) is located inside the tank where the vent line exits the tank. The ball float valve restricts vapor flow from the UST as the tank gets close to full. As the tank fills, the ball in the valve rises, restricting the flow of vapors out of the UST during delivery. The flow rate of the delivery will decrease noticeably and should alert the person responsible for monitoring the delivery to stop the delivery. It may be difficult to determine whether or not this device is present because of where it is located. It may be possible to find an extractor port for the ball float valve (see picture below) but a specialized tool will be required to remove the extractor port. Otherwise, the paperwork must be reviewed to determine whether the tank has this device or ask the contractor who installed the tanks.



Ball Float



Ball Float



Extractor Port Containing Ball Float

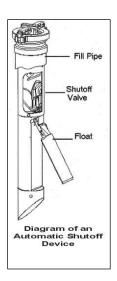


Installed Ball Float



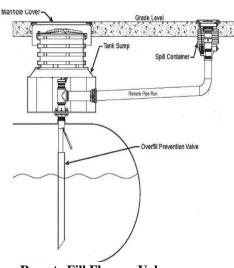
Poppet Valve on riser containing ball float

Automatic shutoff (flapper valves): An automatic shutoff device is located in the fill pipe of the tank. When looking down the fill pipe, it will appear as a line cutting through the fill pipe (or a "half moon" shape in the fill pipe). The automatic shutoff device slows down and eventually stops the flow of product during delivery when the product has reached a certain level in the tank.









Remote Fill Flapper Valve

Overfill alarms (audible/visible high level alarms): An overfill alarm has a sensor in the tank. The sensor is typically connected to a monitoring device such as an automatic tank gauge (ATG). When the fuel in the tank reaches a predetermined level, an audible/visual alarm will be activated. The alarm provides a warning that must be seen or heard (or both) by the person delivering the product when the tank is close to being full. The warning activates when the UST is approaching tank capacity and warns the delivery person to stop delivery. When the alarm activates, the delivery person should immediately stop the flow of product to the tank.



Audible and visual alarm

GENERAL REQUIREMENTS:

- Division regulations require that the owner/operator must ensure that the volume available in the tank (ullage) is greater than the volume of petroleum to be transferred to the tank before the transfer is made. See rule .02(3)(b)1. This is usually accomplished by gauging (sticking) the tank or verifying the volume by reading the inventory printout from an ATG. Also, other agencies require that the transfer operation be monitored constantly to prevent overfilling and spilling.
- Overfill prevention is required for every UST that is filled with more than 25 gallons of product at one time as required by rule .02(3)(a)2.(ii). All overfill prevention devices must be installed, in accordance with the manufacturer's instructions, including routine maintenance for operability as required by rule .02(1)(b).
- Requirements for the three common types of overfill prevention devices:

- 1) Automatic shut off devices (i.e. flapper valves) allowed by rule .02(3)(a)1.(ii)(I), that shut off flow of product into the tank when the tank is no more than ninety-five percent (95%) full or,
- 2) Flow restriction devices (i.e. ball floats)), allowed by rule .02(3)(a)1.(ii)(II), that alert the transfer operator when the tank is no more than ninety percent (90%) full by restricting the flow into the tank or triggering a high-level alarm or,
- 3) Audible or visual devices allowed by rule .02(3)(a)1.(ii)(III), that restrict flow thirty (30) minutes prior to overfilling, alert the operator with a high level alarm one (1) minute before overfilling, or automatically shut off flow into the tank so that none of the fittings located on top of the tank are exposed to product due to overfilling.

INSTALLATION:

Installation must be in accordance with standard industry practices such as PEI RP-100 or API 1615, the manufacturer's installation instructions, and rule .02(1).

OPERATION AND MAINTENANCE:

- For as long as the UST system is used to store petroleum, owners and/or operators shall ensure that releases to the environment due to overfilling do not occur as required by rule .02(3)(b)1.
- Overfill devices usually do not require maintenance (see inspection and testing requirements below) however, a best management practice would be to periodically check to ensure they are in good working order. Below are photos of damaged or missing ball floats. As a result, the Division will require verification during inspection as outlined below.







Missing Ball Float

Damaged Ball Float Cage

Damaged Ball Float

- High level alarms must be positioned so the transfer operator can see **and/or** hear the alarm.
- **Restrictions for operation:** Ball float valves **cannot** be used if any of the following conditions exist for the same tank system:
 - 1) Suction piping is used (if tank is overfilled, fuel may be released through the air eliminator at the dispenser)
 - 2) Pressurized deliveries are made

- 3) Remote fills are used
- 4) Coaxial stage I vapor recovery is used



A manway opening that blew open as a result of a pressurized delivery made to a tank equipped with a ball float valve.

INSPECTION AND TESTING:

- If ball floats are used, their presence must be verified initially during the inspection (and no additional verification required thereafter) by one of the options below:
 - 1) Invoice verifying installation; or
 - 2) Visual verification documented by third party certification; or
 - 3) Field verified by Division inspector during inspection

If a tank owner elects to install a flapper valve in addition to a ball float, it must be set to activate at a lower shutoff level than the ball float according to PEI RP-100.

- If a flapper valve is used, then visual verification should be made by the inspector on the day of the inspection.
- If a high level alarm is used, then the annunciator alarm test button, if available, should be activated by the owner/operator to insure proper operability on the day of the inspection. Also, the location of the annunciator alarm will be verified to determine if it is audible and/or visible to the delivery person.

REPORTING AND RECORDKEEPING:

- Records required to be maintained by the owner/operator:
 - 1) Ball float installation documents, if applicable (see above requirement).
 - 2) Any repair records such as replacement of ball floats, replacement of flapper valves, or repairs to the audible/visual alarm. These records must be maintained for the life of the UST system.
- If a defective overfill device is discovered at any time, then the device shall be repaired or replaced as required by rules .02(3)(b)1. and .02(7)(a) and (f).

• Fuel is sometimes spilled when the tank is overfilled. Any spill or overfill of petroleum that exceeds 25 gallons or causes a sheen on nearby surface water must be reported within 72 hours. Spills and overfills under 25 gallons that are contained and immediately cleaned up do not have to be reported to the Division. See rule .05(4).



An overfilled tank may cause a release from the vent pipe

• Records of any spills, cleanup and abatement activities must be maintained for the operational life of the tank system as required by rule .02(7)(f) and transferred to any new owners as required by rule .03(2)(d).

REFERENCES:

EPA's "UST Systems: Inspecting and Maintaining Sumps and Spill Buckets"

PEI/RP 100-05 "Recommended Practices for Installation of Underground Liquid Storage Systems"

API 1615 "Installation of Petroleum Underground Storage Systems"

PEI/ RP- 1200-12 "Recommended Practices for Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities"

APPENDICES

- 1. Spill Prevention Device Hydrostatic Testing Procedure
- 2. Monthly Spill Bucket Inspection Report
- 3. Spill Prevention Device Hydrostatic Test Report

APPENDIX 1

Spill Prevention Device Hydrostatic Testing Procedure

A test must be performed on each spill prevention device (device) upon initial installation. The test must be conducted for a minimum of one (1) hour. During this time, no deliveries may be made at this fill pipe. The test should be conducted only during a time when there is no chance of precipitation because inclement weather would cause the water in the device to increase by an unknown amount. If obvious damage such as cracks, holes, or defective seal is observed, then the spill bucket cannot be tested.

NOTE: <u>All</u> spill prevention devices, regardless of design (i.e., some spill prevention devices may not be a conventional "spill bucket"), require the initial testing. However, this procedure does not apply to bermed areas used as spill prevention. These areas are subject to visual inspection and any cracks or defects discovered must be immediately repaired.

A. Before Testing:

- 1. Water and a tape measure that is capable of measuring to one-eighth of an inch shall be used. Spray paint or an indelible marker may be used if a tape measure is not available.
- 2. Ensure that the device is empty and clean.
- 3. Make sure that any drain valve is completely closed. If the drain valve is not sealing properly, then it must be repaired before conducting the test. A leaking drain valve may result in a failed test.
- 4. Fill cap must seal properly or be replaced to avoid any surface water intrusion into the tank.

B. Conducting the test:

- 1. Using an indelible marker, mark the inside of the spill bucket at a level which is slightly below the top of the cap on the fill riser.
- 2. Fill the spill bucket with water to the level of the marking.
- 3. Allow water to stand for a minimum of one (1) hour.
- 4. Measure the difference of the water level using a tape measure to the nearest one-eighth of an inch. If no change is detected, then the test may be ended.
- 5. Empty and clean the spill bucket.
- 6. At the end of the test, the water may be re-used for additional testing or must be disposed of properly.

C. Results:

If the water level in the spill bucket decreases by as much as one-eighth of an inch or more, then the spill bucket may be leaking. Determine if the spill bucket can be repaired (if allowed by the spill bucket manufacturer). If not, it must be replaced. If the water level change in the spill bucket is less than one-eighth of an inch, then the spill bucket passes the test. Record the test results on the form in APPENDIX 3, Spill Prevention Device Hydrostatic Test Report, CN 1366.

D. Reporting and Recordkeeping:

The test record must be kept until the next test or until the spill bucket is replaced. The owner/operator shall notify the Division within 72 hours prior to any replacement. This will allow a Division inspector to be present to determine if an environmental impact has occurred and if a site check will be required. Repairs may only be made if allowed by the spill bucket manufacturer.

APPENDIX 2 (examples provided)

Fillable Versions Are Available on the Division Website



STATE OF TENNESSEE **DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

Monthly Spill Bucket Inspection Log

DIVISION OF UNDERGROUND STORAGE TANKS 4TH Floor, L & C Tower **401 Church Street** Nashville, TN 37243-1541

Instructions

Tennessee Underground Storage Tank Rules require that visual inspections be made of all spill buckets on a monthly basis. In accordance with these rules, spill catchment basins shall be visually inspected by the owner and/or operator at least once a month to assure the integrity of the storage space provided for spill containment. A log of these inspections showing at a minimum the last twelve (12) months shall be maintained by the owner and/or operator.

- This form shall be utilized to record the results of visual inspections of each spill bucket at the facility once each month.
- A separate form should be used for each facility. The year the spill bucket inspections are performed shall be recorded in the space provided.
- The front of this form has space for up to six spill buckets. If there are more than six spill buckets at this facility, use the back of this form or make additional copies.
- If no standing liquid, debris or spill bucket defects (cracks, torn connectors, etc.) are noted, write "OK" in the appropriate column and row.
- If any standing liquid, debris or spill bucket defects are noted, write "Not OK" in the appropriate column and indicate what action was taken.
- If there are spill bucket defects and indications of released petroleum, it must be reported as a suspected release within 72 hours in accordance with Division regulations.

• Maintain the last 12 months of these inspections and have them available for state inspection.

USI FACILITY INFORMATION									
NAME:				FACILITY ID #:			ΥE	AR:	
ADDRESS:				CITY:			ZIF	o.	
Checked	Monthly Spill Bucket Visual Inspections								Action taken if
MM/DD/YY	Record condition in each block for the appropriate spill bucket (SB)								SB not OK
	SB # 1	SB # 2	SB # 3		SB # 4				323
	Regular	midgrade	premium		esel	32 3	05 0		
	ОК	ОК	2 " water	debr	is				Removed water in
06/01 /11									SB#3 and removed
									debris in SB#4
1 1									
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Use this side for additional spill buckets present at this location. Please indicate spill bucket number in the space provided. Use additional sheets for this location if necessary.

Checked MM/DD/YY	Monthly Spill Bucket Visual Inspections Record condition in each block for the appropriate spill bucket (SB)						Action taken if SB not OK
	SB #		1		SB #		
/ /							
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CN-1286 RDA 2304

APPENDIX 3



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF UNDERGROUND STORAGE TANKS
4th Floor, L & C Tower, 401 Church Street
Nashville, TN 37243-1541

SPILL PREVENTION DEVICE HYDROSTATIC TEST REPORT

- > This form must be used in conjunction with **Technical Chapter 4.2 SPILL AND OVERFILL PREVENTION**, <u>APPENDIX 1</u> "Spill Prevention Device Hydrostatic Testing Procedures".
- If a defective spill prevention device is discovered at any time, then the device shall be repaired or replaced.
- The owner/operator shall notify the Division within 72 hours prior to any repair or replacement. **Repairs may only be made** if allowed by the spill bucket manufacturer.

If a defective spill prevention device is replaced, a Division inspector should be present to determine if an environmental impact has occurred and if a site check will be required.

Social Carla II a Site Greek Will be required.									
I. FA	ACILITY		II. OWNER						
UST Facility ID #:			Name/Company:						
Facility Name:			Address:						
Address:			City, State, Zip:						
City:	Count	y:	Phone: () -						
		III.	TESTER						
Name:			Company Address:						
Title/Position:			City, State, Zip:						
Company Name:			Phone: () -						
IV. TEST RESULTS									
Spill Device ID	Initial Re		nal Reading It least one hour)	Difference (> 1/8 inch is FAIL)	Pass/Fail				
Example: Tank 1A Premium	8 1/4 in.		8 1/4 in.	0 in.	Pass				
Example: Tank 2A Diesel	7 1/2	in.	7 in.	1/2 in.	Fail				
NOTE: Use as many co	ppies of this fo	orm as needed. <u>Eac</u>	ch copy must als	o be signed as required I	pelow.				
		C	ertification						
I certify under penalty of la accurate, and complete.	w, that I have	adhered to the pro	per test procedure	es and that the information	n presented here is true,				
Tester's Signature/Date:			Tester's Name Printed:						
Owner/Operator's Signature/Date: Owner/Operator's Name Printed:									

CN-1366 RDA 2304